

THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XII

MARCH, 1939

No. 3

Cost of Brazing Is Reduced by Newer Gases

Process Joins Metal Parts by Lower Melting Point Metal in Controlled Atmosphere

By Amos D. McGary

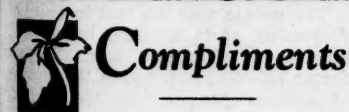
York Chapter—In introducing his talk on "Electric Furnace Brazing" at the meeting on Jan. 12, E. K. Hanson, of Westinghouse Electric & Manufacturing Co., Industrial Heating Section, gave a brief history of the process from the time of its beginning some 30 years ago.

Hydrogen and dissociated ammonia were the first atmospheres used, but with the development of atmospheres made from products of combustion of hydrocarbon gases for such processes as bright annealing, furnace brazing really began to grow. These new atmospheres were much cheaper and their many advantages induced industrial organizations to reconsider their products from the standpoint of obtaining higher quality at less cost.

Some of the advantages claimed for the process are high strength joints, simplicity in fabricating assemblies, elimination of machining and patterns, uniformity, increased production and reduced costs.

The process joins metal parts by using another metal of lower melting point. Usually parts are assembled with brazing material placed conveniently near the joints, and sent through an electric furnace having a controlled atmosphere. The atmosphere prevents oxidation of the parts and allows the brazing material to melt, wet the sur-

(Continued on page 4)



Compliments

To C. H. Mitchell, J. T. Tiplady and P. S. Strickland, all members of the Ontario Chapter, on their promotion by the Canadian Westinghouse Co. to works manager, general superintendent, and superintendent of the electrical division, respectively.

To New Jersey Chapter, on the royalty represented on its Executive Committee—E. D. King, New York sales representative, Universal-Cyclops Steel Co., and John W. Queen, Jr., sales representative, Joseph T. Ryerson & Son.

To METAL PROGRESS Editor Ernest Thum, on his promotion to chairman of Committee B-2 on Non-Ferrous Metals and Alloys of the American Society for Testing Materials, after some 15 years' service as secretary of the same committee.

To R. B. Sosman, U. S. Steel Corp. Research Laboratory, on his appointment to the chairmanship of the Metals Industries Committee for the symposium on "Temperature and Its Measurement in Science and Industry" to be sponsored by the American Institute of Physics next fall.

Stoughton Honored by Lehigh Chapter



National Officers Night of Lehigh Valley Chapter Brought Together a Number of Celebrities. Pictured at the speakers' table are: Top row—C. C. Williams, president, Lehigh University; W. P. Woodside, national president A.S.M.; National Secretary W. H. Eisenman, and National Treasurer Bradley Stoughton, guest of honor. Bottom row—H. L. Fry, secretary Lehigh Valley Chapter; Wilbur E. Harvey, past chairman; M. W. Dalrymple, present chairman; and George E. Brumbach, vice-chairman of the Chapter.

Treasurer Given Engraved Watch, Tells Reminiscences

Lehigh Valley Chapter—A dinner in honor of Dean Bradley Stoughton of Lehigh University was the feature of National Officers' Night on Feb. 3.

After Chairman M. W. Dalrymple turned the meeting over to the inimitable Bill Eisenman as toastmaster, remarks were made by President C. C. Williams of Lehigh University, President Woodside of A.S.M., Past President W. B. Coleman of A.S.M., and finally by Wilbur E. Harvey, past chairman of the Chapter.

In token of Dean Stoughton's effective services to the metallurgy of the region, of his service as past chairman of the Chapter, and as national treasurer of the Society, the Chapter, through Mr. Harvey, presented him with a gold stop watch suitably engraved.

Gives Anecdotes of Famed Men

Dean Stoughton's address, entitled "Reminiscences", brought out traits and anecdotes of leaders in the field of metallurgy during the past 35 years whom he had known both as national secretary of A.I.M.E. for ten years and in consulting capacities. Henry M. Howe, as a teacher and friend; Andrew Carnegie; Sir Robert Hadfield, whom he has frequently represented technically in this country; John Fritz; Charles M. Schwab; and Eugene Schneider, of the Creusot Works in Czechoslovakia, were among the most interesting personalities referred to.

The audience stood in silent memory of the late Prof. Albert Sauveur. More than 100 were in attendance, including a number of steel executives.

Exhibitors File Space Choices In Metal Show

Floor Plans to Be Given General Distribution in April; Early Reservations Heavy

The 1939 National Metal Congress and Exposition are on their way.

In late February a floor plan giving the layout of the International Amphitheatre, Chicago, was sent to all previous exhibitors in order that they might have an opportunity to indicate their choices of space before the floor plans are given general distribution, sometime after April 8 when the spaces will be assigned.

Response to the mailing of floor plans was immediate. Telephone, telegraph and special delivery letters and personal calls were used by the exhibitors to file their choices of location for the consideration of the assignment committee.

The National Metal Exposition will be held the week of Oct. 23 in the same building which housed the exposition on its last visit to Chicago.

Technical Papers Indicate Research

The National Metal Congress, held simultaneously with the exhibit, is also rounding into shape in a most satisfactory manner. According to Assistant Secretary Bayless, in charge of technical activities, the acceptance of invitations to present papers at the fall meeting of the Society has been the most responsive in years, indicating that a great amount of research and investigational work is being carried on in the metal industry.

The Educational Committee of the Society has arranged for very interesting afternoon and evening lecture courses, and a special symposium on a subject of current importance will again feature the regular morning and afternoon technical sessions.

Headquarters for the American Society for Metals during the week of the Congress will be at the Palmer House in downtown Chicago.

Return Your Old Handbook For New 1939 Edition

THE new 1939 edition of Metals Handbook, published by the American Society for Metals, will be ready for distribution to all members of the Society in good standing on, or shortly after, April 1st. This edition contains 430 articles, totaling 1776 pages, greatly increasing the value of the Handbook.

All you need do is return your old copy of the 1936 edition (now obsolete) to American Society for Metals, 7016 Euclid Ave., Cleveland, Ohio, and your copy of the new 1939 edition will be sent free and postpaid to you promptly.

Woodside Names Nominating Committee, Suggestions for Candidates Welcomed

In accordance with the constitution of the American Society for Metals, President W. P. Woodside has selected a nominating committee from the candidates submitted by the chapters.

This committee will meet during the third full week in the month of May, and shall name one candidate for each of the following offices:

President 1 year
Vice-President 1 year
Treasurer 2 years
Two trustees for 2 years each

The committee will welcome suggestions for candidates in accordance with the Constitution, Article IX, Section 1 (b), which provides that endorsements of a local executive committee shall be confined to members of its local chapter, but individuals of a chapter may suggest to the nominating

committee any candidates they would like to have in office.

Endorsements should be sent in writing to the chairman or other members of the committee at the following addresses:

Gordon T. Williams, Cleveland Tractor Co., Cleveland, Ohio (Cleveland Chapter), Chairman.

John S. Marsh, 29 W. 39th St., New York City (New York Chapter).

Neil P. Petersen, Canadian Acme Screw & Gear Co., Ltd., Toronto, Canada (Ontario Chapter).

S. H. Graf, Oregon State College, Corvallis, Ore. (Oregon Chapter).

G. C. Riegel, Caterpillar Tractor Co., Peoria, Ill. (Peoria Chapter).

R. W. Schlumpf, Hughes Tool Co., Houston, Tex. (Texas Chapter).

Hyman Bornstein, Deere & Co., Moline, Ill. (Tri-City Chapter).

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Curves Illustrate Ratio of Nitriding to Carburizing In Liquid Carburizing

By V. A. Crosby

Detroit Chapter—In accounting for the unusually large attendance at the January meeting, we salute the speaker of the evening who presented a most interesting lecture on the subject of carburizing of steel, with special reference to thin case carburizing as effected by liquid carburizers.

R. J. Cowan, metallurgical engineer of the Surface Combustion Corp. of Toledo, drew upon his vast experience, both technical and practical, to give the members food for thought and ways and means of applying the information. Mr. Cowan showed some interesting curves illustrating the ratio of nitriding to carburizing in liquid carburizers as the bath ages.

A talking movie by Bethlehem Steel Co. on the building of the San Francisco Bridge was shown immediately after the dinner. The picture was educational as well as entertaining—the type that fits into A.S.M. meetings admirably.

The overflow crowd, far in excess of the number expected for dinner, caused fully an hour's delay in getting the program under way. These matters can be handled with complete satisfaction if members will indicate their intentions on the postage-free cards mailed to them.

New Jersey Uses Movies For Educational Course

New Jersey Chapter is currently conducting a unique educational course of motion pictures. At each of five meetings an interesting educational film is presented. Speakers are present to explain the subjects in detail and an opportunity is given to ask questions following the presentation.

Subjects and dates are as follows:
March 1—Aluminum; sound film and description by Aluminum Co. of America.

March 8—Tool Steel; manufacture and fabrication by Crucible Steel Co.; flame hardening and finishing by Monarch Machine Tool Co.

March 15—Oxy-Acetylene; films and slides by The Linde Air Products Co.

March 22—Steel; U. S. Steel Corp. films on "Walls Without Welds" and "Steel—Man's Servant" presented by Peter A. Frasse & Co.

March 29—Coke; films by Koppers Co. and E. I. du Pont de Nemours & Co.

Buttons and Bottle Caps Consume Large Quantities of Plastics

By A. W. Demmler

Pittsburgh Chapter—February 9 was National Officers' Night. President Woodside and Mr. Eisenman were with us in usual good form, as well as Vice-President "Jim" Gill.

The weather poured out some of the crowd, but that did not keep those present from getting a good picture of "Modern Plastics" from W. B. Hoey, engineer, Bakelite Corp.

Did you know that several million pounds of plastics have gone into bottle caps for each of the last few years? And even more has gone into buttons.

Phenolic and urea base materials are thermo-setting or heat hardening grades for pressure molding. Thermoplastic materials are cellulose acetate, acrylate (clear as quartz) and polystyrene; these are injected into the mold and chilled to set.

To the amateur, the latter grades might seem preferable, but there are numerous applications where the former grades lead; each grade has its special properties. (Incidentally none of these materials possesses a tensile strength much in excess of 8000 psi.)

C. D. Shaw of Shaw Laboratories, Birmingham, Mich., as technical chairman, discussed the mechanical side of the problem. Die materials are not yet to the stage of standardization. Carburization, nitriding and electroplating have been considered but each has its limitations.

The injection cylinders are probably a more serious problem than the dies and now a machine has been developed for the injection of heat hardenable types of plastics; this, of course, means critical control of the entire cycle.

Mr. Hoey demonstrated the physical characteristics of some half dozen plastics and displayed a collection of products that left no doubt of the large field in which these materials compete.

Herty Talks of Bandits and Steel Making; Emphasizes Deep Drawing, Grain Size

By A. L. Rustay

Chicago Chapter—C. H. Herty, Jr., Bethlehem Steel Co. researcher, prefaced his address with the remark that the last talk he had given in Chicago had been a memorable occasion for him. This was on St. Valentine's Day, 1929, the day that seven men were lined up against a wall and machine gunned to death in a garage just south of the Chicago Loop.

Dr. Herty discussed, as mill man to consumer, the two features that in his opinion have been most improved upon by changes in basic open-hearth steel making practice in recent years—namely, the deep drawing properties of steel and grain size control.

The deep drawing qualities have been improved because of the demands of the automotive industry. Grain size control has been the result of demands from heat treaters for steel with a more uniform response, from heat to heat, to large scale production heat treatment.

Silica-Lime Ratio of Slag Important

The general superiority of low sulphur, low oxygen, deep drawing steel has resulted in slag control in the United States that seems to be much more rigid than the usual foreign practice. The basic melter is now asked to meet a 0.030 max. sulphur instead of 0.045 as in past years and tries to control slag composition so that a consistent oxygen equilibrium exists, from

Relative Figures Show Comparative Membership Standings of the Chapters

The following list shows the relative membership as of March 1 of the various chapters of the American Society for Metals. The actual membership of each chapter is not given, the figures merely representing the number of members each chapter has less than the chapter listed next above.

Chicago—Largest Chapter	Washington	0
Pittsburgh	Canton-Mass.	4
Detroit	Columbus	11
Cleveland	Dayton	0
Philadelphia	North West	0
New Jersey	Schenectady	1
New York	Baltimore	3
Boston	Oregon	0
Montreal	St. Louis	9
Los Angeles	York	7
Ontario	Syracuse	3
Milwaukee	Indianapolis	10
Lehigh Valley	Rhode Island	0
Rochester	Penn State	7
Peoria	Mahoning Val.	2
New Haven	Springfield	6
Texas	Notre Dame	9
Cincinnati	Southern Tier	4
Golden Gate	Muncie	4
Buffalo	Puget Sound	0
Hartford	Rockford	1
Calumet	Mich. Col. M & T	6
Worcester	Mo. Schl. M & M	20
Tri-City	Va. Poly. Inst.	26

Woodside Visits North West Presents Alloy Steel Movie

By Ray P. Dunn

North West Chapter—The meeting of Jan. 9 was opened with the showing of a movie of the 1938 Minnesota football team in action.

Following this *hors d'oeuvre*, the main course of the evening was the presentation of W. P. Woodside, president of The American Society for Metals, and W. H. Eisenman, national secretary.

Mr. Woodside gave a brief account of the development of alloy steels as an introduction to his movie. Both features were very interesting and well presented.

Mr. Eisenman presented a review of the activities of the society during the last year and topped the evening off with many excellent anecdotes.

heat to heat, between slag and steel when tapped.

The speaker observed that technical temperature control is still pretty much "by guess and by God", and quoted an article to the effect that "after the steel is at the proper temperature, in the opinion of the melter, the pyrometer should be used" (presumably to confirm the opinion of the melter!).

Rimmed steel is preferred where ductility is of paramount importance, semi-killed steel for an economical product with good static physical properties, and killed steel for maximum properties, including hardenability.

Further details of Dr. Herty's lecture are given in the Milwaukee Chapter report on page 5.

Barker Lectures at Detroit

"Physics of Solids" is the erudite subject of the educational lectures being presented by the Detroit Chapter during March. Ernest F. Barker, professor at University of Michigan, is the lecturer.

The first lecture on Feb. 27 considered "Metals in the Family of Elements"; at the meeting on March 6 "Some Optical Properties of Solids" were discussed. Subject of the March 20th lecture is "The Metallic Crystal".

On March 28 Dr. Barker will speak on "Batteries and Magnets" and on April 3 his subject will be "Radioactivity, Natural and Artificial".

Automobile Has From 50 to 100 Die-Cast Parts

Zinc and Aluminum Are Most
Popular; Brass and Magnesium
Also Commonly Used

By M. A. Hughes

New Jersey Chapter—Charles E. Pack, vice-president, Doehler Die Casting Co., New York, presented the January meeting subject "Die Castings". Mr. Pack illustrated his talk with a large display of die castings of all shapes and sizes.

In 1905 the first attempt at making mechanical die-cast parts for the automobile was undertaken with a zinc-base lead alloy. The first castings gave poor results. Today, however, they are quite satisfactory, as attested by the fact that there are from 50 to 100 die-cast parts on every automobile.

In 1915 the commercial process for aluminum die casting was developed and today the volume of aluminum die castings is exceeded only by zinc. Compressed air at pressures up to 500 psi. is used for making aluminum die castings. Today, however, the plunger type pump is being developed for them.

Brass die castings are being made at the present time with the same ease as zinc and aluminum. The short mold life, because of high casting temperature, makes brass castings almost prohibitive in price.

In recent years magnesium die castings have been made, surface oxidation being the only difficulty encountered.

Avoid Undercuts Is Basic Design Rule

In designing for die-cast parts there is no general yardstick or rule that can be applied. The one basic rule should be to avoid undercuts.

If increased physical properties are desired, inserts of steel or bronze may be resorted to. Die castings are often used as a step in other methods of manufacture.

Accuracy is the most important factor in die casting. Closer tolerances may be obtained with the low melting alloys. As the melting temperature of the alloy increases it becomes increasingly more difficult to die cast.

The metals now die cast in order of decreasing costs are tin, brass, lead, magnesium, aluminum, zinc. Another factor affecting the cost is the number of castings obtained from the mold before its failure.

Al-Zn Alloys Most Permanent

Most permanent alloy used today is 4% aluminum, balance high grade zinc. This alloy must be free from impurities as even small amounts cause deterioration. Maximum allowable is 0.005%.

Of the aluminum alloys used, the 12% Si, 88% Al alloy is universal for all die casting applications. Another contains 8% Cu and 92% Al, and a third with 8% Mg and 92% Al has the advantage of corrosion resistance, high polish and good machining.

Other alloys commonly used for die castings are 10% Al, 90% Mg and 60-40 brass.

Aluminum die castings take a good polish and are readily nickel or chromium plated. Zinc die castings have a smooth surface and require no grinding or cutting down before plating.

Other types of finishes are organic lacquers, a dip of cellulose nitrate and recently a thermoplastic material. This is cast around the die casting, and is very durable and equals the strength of the zinc die casting itself.

A lengthy open discussion of Mr. Pack's talk was led by Chapter Chairman G. M. Rollason.

Interrupted Quench Applied to Cast Iron Improves Cam Wear

Bartholomew Explains Use of This Heat Treatment for Shoe Machine Parts

By Don Sawtelle

New Haven Chapter — E. L. Bartholomew, metallurgist of the United Shoe Machinery Corp. of Beverly, Mass., was the speaker before the Chapter on Jan. 19. His subject, "The Interrupted Quenching of Cast Iron", was new to many members and only a few years ago unheard of by any.

Mr. Bartholomew gave an interesting talk on his work to improve the wearing qualities of cams which are the most vital of the working parts of the machines which his company manufactures.

By his own experiments he has successfully used the interrupted quench method of heat treatment to increase greatly the wearing life of gray iron castings up to 2 in. in thickness and 150 lb. in weight.

The well-known "S" curves obtained by Davenport and Bain in their work on steels are moved to the right for normal unalloyed cupola gray irons and still further to the right if alloyed, for instance, with 2% nickel. Austenite is retained at room temperature, and when worked is transformed into martensite. The combination of acicular troostite or bainite and martensite gives the long wearing properties of the material.

The further to the right this "S" curve is moved, the thicker the section of gray iron which can be completely hardened by the interrupted quench, as the time necessary for the transformation of austenite is greater.

Mr. Bartholomew stressed the point that gray iron castings of today are not simply molten pig iron cast into the necessary shapes, but a closely controlled metallurgical product worthy of more study by leading metallurgists.

Essentials of Patent Law Reviewed in First of 3 Lectures

Chicago Chapter—J. A. Diener, patent attorney, presented the first of three lectures on the topic "Essentials of Patent Law".

The history of patent law was briefly sketched and remarks were included on the relative freedom from governmental regulation and supervision that the inventor has enjoyed. The speaker pleaded for a continuance of this "policy of non-intervention", noting that during depression years it is a historical fact that our patent laws have been vigorously attacked.

The merits of the present law were discussed in some detail and were strikingly illustrated with excerpts from testimony given before the examining board at the recent government investigation of patent law.

At present, the inventor and the promoter of a patentable invention are given a 17-year monopoly to manufacture and sell the article, as a reward for their development work. This material compensation stimulates the invention and development of new products, in the opinion of Mr. Diener, by providing prospects for large profits. Alternative methods of compensating the inventor and the promoters were critically examined and discarded as inadequate.

Subsequent lectures of this series will be devoted to a more detailed study of certain aspects of patent law.

Camera Catches a New Haven Chuckle



Candid Camera Shot of New Haven Chapter Head Table at Dinner Preceding January Meeting. Left to right—F. Farrel, 3rd, technical chairman; E. L. Bartholomew, speaker; Al Pollard, chairman; and L. E. Raymond, vice-chairman. (Photograph by A. L. Knight, visiting vice-chairman of Boston Chapter).

42% of Copper Consumption in 1936 Was Secondary Scrap, Baltimore Learns

By H. D. McCarty

Baltimore Chapter on Feb. 20 heard H. M. Shepard, general superintendent, Baltimore Plant, American Smelting & Refining Co., on "Copper Refining".

The consumption of refined copper in 1936 was 1,129,164 tons; however, of this total 472,985 tons were what is known as secondary copper.

Since copper does not corrode or deteriorate, it can be recovered after its useful life is over. Consequently, it returns to the market as scrap and thence to the refineries. The tonnage of this secondary scrap amounted to 42% of the copper used in 1936, thereby indicating the important part it plays in the present-day refining of copper.

The theory of electrolytic refining is simple. If two copper electrodes are immersed in an electrolyte of suitable composition, and these electrodes connected to the terminals of a generator—the negative pole to a sheet of pure copper and the positive pole to a plate of impure copper—and a direct current of suitable voltage and density passed between them, the current will enter the anode and pass through the solution to the cathode. The pure copper will be dissolved from the anode and an equivalent quantity deposited on the cathode.

Multiple Series Refining Discussed

There are two systems of electrolytic refining. One is known as the "multiple system" and the other as the "series system", deriving their names from the arrangement of the cells. Mr. Shepard confined his talk to the multiple system.

In the multiple process, the usual practice is to make two pulls of cathodes to each anode. Because good metallurgical results cannot be obtained if anodes are corroded too far, well-run copper refineries have an anode scrap return of about 15% of the original anode. This scrap is remelted in the anode furnaces.

The melting operations in copper refineries are carried out in refractory lined reverberatory furnaces. Blister, which is the final product of the

smelter operations, is melted and cast into anodes. The cathodes, after the electrolytic refining proper, are melted and cast into refined shapes.

Intensive Research Under Way

Copper refining, like other industries, is carrying on intensive research work. The vertical cast wire bar and cake, scalped wire bar, and continuous cast billets are recent developments.

The withdrawal of Chairman Leo Gould because of his transfer from the Baltimore plant of the Bethlehem Steel Co. to their Bethlehem plant provided a first glimpse of Dr. Jack Miller is his new role of acting chairman. He began a lively discussion which continued until time for refreshments.

Parker Speaks on Creep Studies at Schenectady Chapter

By C. B. Brodie

Schenectady Chapter—National Secretary W. H. Eisenman was an unexpected guest at the February meeting. His report of the activities of the society was enjoyed by everyone.

E. R. Parker of the General Electric Research Laboratory was the speaker of the evening on "Creep Studies and Their Applications".

Among other things it was pointed out that temperature has practically no effect upon the short time tensile strength of steel at low temperatures but above a certain temperature, which varies for different steels, the strength drops exponentially.

The effect of temperature, stress and time upon the fracture of steels at elevated temperatures was illustrated by a series of slides. It was shown that in a metallurgically stable steel, the time required for fracture to occur at constant temperature is related only to the stress, and the time to fracture at constant stress is related only to temperature. Fractures may be intergranular or intragranular, depending upon the stress, temperature, and time involved.

Creep tests are made in order to study the behavior of metals under stresses which would produce fracture only after many years.

The creep rate at a given stress is affected by temperature, chemical composition, grain size, metallurgical structure and cold work. Steels strengthened at room temperature by quenching, reducing the grain size, or cold working will be weaker at elevated temperatures than an annealed steel of large grain size.

New Instrument for Weather Forecasting Perfected at Caltech

Second Speaker Discusses Experiences in Testing for Oil

By James Patterson

Los Angeles Chapter—A talk on "Weather Forecasting", presented by I. P. Krick of the California Institute of Technology at the meeting on Jan. 12, was accompanied by a motion picture and slides showing cloud formation, rain charts and weather maps.

Plotting weather charts is the weatherman's biggest job. In years past forecasts were based wholly on the use of surface information, but the modern forecaster now recognizes that weather originates at high levels.

Scientists at the California Institute of Technology have perfected an instrument called the Radiometerograph. It consists of pressure, temperature and humidity elements and a radio transmitter, and must be constructed of light weight material so that it may be sent aloft attached to a free balloon.

The power unit is a lead acid storage battery with cells about half the size of a postage stamp. The radio weighs 2 oz. and operates at a wave length of 1.67 meters. A receiver automatically plots pressure, temperature and humidity. The equipment goes to a level of 90,000 ft.

Information given on daily weather charts is of great value to the aviation industry, gas companies, anti-freeze industries, motion picture companies, department stores and beach clubs.

Following Dr. Krick's talk, a paper on "Geophysical Exploration of Oil Structures" was presented by G. L. Knox of Standard Oil Co. of Calif.

Mr. Knox told of many interesting experiences in making tests for oil throughout the world. His talk was accompanied by a very interesting set of slides showing difficulties encountered in making surveys for oil in various localities.

At the conclusion of Mr. Knox's talk those present were given an opportunity to question further Mr. Knox and Dr. Krick on their respective subjects. Dr. Krick demonstrated a model Radiometerograph at this time.

New Industrial Film Pictures Swedish Steel Manufacture

Demonstrating that a modern and progressive industry can be efficiently operated with the resourceful application of both the latest technological advances and many old-fashioned hand skilled methods, a new industrial film has been prepared in Sweden picturing the activities of the 270-year-old Uddeholm steel organization.

The film shows the making of many types of steel, from the raw material stage to the final packing. It is well sequenced with views of the plants from an airplane, the mining of ore, the production of charcoal, making of pig iron and ferro-alloys in electric blast furnaces and the operation of acid process open-hearth.

Hot and cold rolling of ingots, billets and rods, the piercing of tubes, interior and exterior grinding of tubes and annealing and pickling are effectively photographed.

An English narration accompanies this 30-min. film which is available to A.S.M. Chapters from the nearest office of Peninsular Steel Co. or from Uddeholm Co. of America, Inc., 155 East 44th St., New York City.

Vice-President Gill Talks On Modern High Speed

By R. J. Haigis

Hartford Chapter—Tuesday, Feb. 14, marked a gala evening. In addition to being designated as "Past Chairmen's Night", the chapter also had the pleasure of entertaining and being entertained by National Secretary Bill Eisenman and the privilege of hearing National Vice-President James P. Gill speak on the subject "Modern High Speed Steels". It was learned with regret that National President W. P. Woodside could not be present.

It is a fitting procedure that each year Hartford Chapter should honor its past chairmen, for it has been through their efforts that the Chapter

has developed into a stable unit of quality, if not quantity.

To attempt to give a synopsis of Jim Gill's talk on "Modern High Speed Steels" would be to do a great injustice, for if but one sentence were left out, much of the value would be lost.

National Secretary Bill Eisenman was asked to give a pep talk explaining the merits and advantages of joining the A.S.M. to those present who were not members. Quite frankly, when he got through with his talk he even had some of the members thinking that they were getting so much value for a \$10.00 fee that, possibly, they should take out dual memberships.

Incidentally, during the course of the entire evening, Mr. Eisenman did not tell a single joke or funny story—that didn't bring the house down!

Fuel Injection Systems Use Various Steels

Speaker Outlines Types, Inspection Tests; Tells of Change From Tractor Manufacture

By Clinton L. Dornbush

Golden Gate Chapter—"Metallurgical Inspection and Heat Treating Equipment" was the title of the talk given by F. I. Donlevy at the regular January meeting. Mr. Donlevy is in charge of the metallurgical department at the San Leandro plant of the Caterpillar Tractor Co.

Mr. Donlevy explained that the San Leandro plant is now making fuel injection systems instead of tractors. This has necessitated a complete change in inspection procedure and equipment.

The Brinell machines have now been mostly replaced with Rockwell superficial hardness testers. The inspector, instead of handling large track sprockets, can now hold a day's inspection work in his lap. The car-bottom annealing furnace has been replaced with small atmosphere controlled furnaces.

Of the steels used in the manufacture of fuel injection systems, S.A.E. 1020 and S.A.E. X1020 are used for parts that are not highly stressed and are not heat treated or require cyanided or pack carburized surfaces.

S.A.E. Steels Listed

S.A.E. 3135 is used for parts requiring superior physical properties in either the heat treated or as-received condition. For a few forgings which require a higher elastic limit than S.A.E. 1020, X3140 is used. Some parts requiring very tough steel are made from 2345.

S.A.E. 52100 is used for several very important parts requiring highest wear resistance and to be finished machined to the utmost degree of precision.

High speed steel is used for one part requiring hardness at elevated temperatures and low carbon stainless steel for another where corrosion is a problem.

No free machining steels are used in the fuel injection system; unsatisfactory heat treating properties and an increased inventory would more than offset any reduced machining costs.

Special Tests Required

The precision necessary in manufacturing fuel injection systems and the service demands on the parts require a very elaborate method of material inspection. Besides the standard mill inspection, special tests are specified.

One such test is presampling for chemical analysis while the steel is held in the bloom form. After the bars are rolled and annealed they are sampled on a percentage basis and the ends are sent to the separate metallurgical departments in San Leandro and Peoria for checking the regular and incidental alloys.

Incidental alloys are usually nickel, copper, vanadium, molybdenum and tungsten. They are important because they often affect the properties of the steel far out of proportion to the quantity present.

The next test is for hardenability or response to heat treatment. Stringent control is exercised over this test.

WANTED

Used B. & L. FSM Microscope
With or without camera
Also Polishing Equipment

Address Box 3-1
American Society for Metals
7016 Euclid Ave. Cleveland, Ohio

Reduced Cost One of Many Advantages Of Furnace Brazing

(Continued from page 1)

faces, and flow by capillary attraction into the joints. Upon cooling, the alloy formed by the brazing material and parent metals solidifies, forming extremely strong and uniform joints.

Steels, particularly low carbon, comprise a majority of the applications. Other metals such as copper, brass and nickel silver are easily joined but require more care to prevent embrittlement or volatilization of such constituents as zinc. The use of a flux is often sufficient to insure good results with otherwise difficult assemblies.

Copper Used to Bond Steel

Ordinary brazing materials are copper, phosphor bronze, brass, and silver solders. Copper is generally used to bond steel parts. It is an ideal material because it is cheap, possesses a definite melting point, becomes fluid, wets steel surfaces readily and flows long distances in joints. It forms a strong alloy with iron.

Phosphor copper is comparatively inexpensive and is used widely. It does not form strong joints with steel because iron phosphides are formed.

Brazing material is generally applied as wire, strip, shims, or paste, wound around or laid near the joints. Rings of wire may be slipped over the assembly.

Brazed parts coming from an electric furnace with controlled atmosphere seldom need cleaning or pickling because the atmosphere prevents oxidation. Where fluxes are necessary, they are removed by brushing or washing, but the surfaces are usually clean.

Data Show Strength of Joints

Data were presented showing the high strength of brazed joints in both low carbon and alloy steels. Data on the strength of copper brazed joints subsequent to various heat treatments indicated that harsh heating and quenching treatments usually impair the strength of the joints, although they are still superior to many other methods of fastening.

Mr. Hansen showed a number of slides illustrating the simplicity of construction. Parts are usually made from bars, tubes, plates, punchings or stampings. They are simple and easy to make compared with machining from solid stock, casting or forging.

In addition to the illustrations, there was a display of brazed samples. Some assemblies had only one joint while others had hundreds, all made in one pass through the furnace.

At the close of Mr. Hansen's talk a very interesting discussion took place, showing the members to be keenly interested in the possibilities of furnace brazing as it might be applied to their individual problems.

Specimens of specified design are heat treated by a prescribed method and must attain a hardness very near the maximum obtainable.

The specimens are also examined macroscopically for slag, segregations, pipe, ruptures and surface seams; microscopically for inclusions the size and dispersion of which is limited. Spheroidized structure free from continuous carbide grain boundaries, coarse carbides and pearlite is required. This type of structure is calculated to produce good machining and normal response to production heat treatment.

The remainder of the meeting time was used to show the picture entitled "The Family Album" which illustrated the many uses of Caterpillar tractors.



RECOGNITION for the ASM motorist!

If you have ever motored out of your own state you know what a thrill it gives you to see a car with your home state license approaching on the highway. If you are far away from home you sometimes give a toot on your horn just to convey a neighborly friendship to someone from your "neck of the woods."

This spirit of comradeship on the road has been recognized by your Society. It is now possible for members to purchase at a slight cost an attractive metal Auto-Emblem which can be placed on your car to identify you as a member of the American Society for Metals.

The emblem measures 3½" in diameter. On a gold background it shows a map of the United States and Canada with the ASM monogram spreading over it. Circling the map are the words "Member American Society for Metals." This attractive set-up is easily recognizable at a distance.

You will want one of these emblems. It will identify you as a brother ASM member to metal men all over the nation . . . and give you friends in every "port."

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Gentlemen: I am enclosing check or money order for \$1.00 which is to cover the cost of the ASM Auto Emblem. Please send me the emblem at once.

NAME
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No Atmosphere Is Universal for Heat Treating

Varies With Temperature, Composition and Previous History of the Steel

By J. W. McBean

Ontario Chapter—A particularly timely paper on the effects, measurement and control of furnace atmospheres by A. E. Krogh of the Brown Instrument Division of the Minneapolis-Honeywell Regulator Co. featured the February meeting.

Scaling, decarburization and pitting greatly affect the surface of steels under ordinary furnace conditions, and in some cases undesirable changes may take place below the surface. There is no one furnace atmosphere that can be universally used, since the effect of any atmosphere on any given steel varies with the temperature, and at any temperature varies with the composition of the steel.

Even the previous history of the steel will affect the result. For instance, a piece of plain carbon tool steel, if placed directly in 10% CO at 1450° F. and held until ready to quench, will decarburize, but an identical piece of steel preheated to 1050° F. in air, held at that temperature for ½ hr. and then placed in 10% CO at 1450° F., will be glass hard and free from surface injury.

Quick Measurement Difficult

It is not easy to reproduce satisfactory test results because of the difficulty of measuring quickly the actual contents of the furnace atmosphere at any particular time. The Orsat apparatus is useful for laboratory tests, but gives no information as to the very important matter of moisture content. Humidity of the external atmosphere, cleanliness of the steel, or door openings may all affect the result.

In the final heating of high speed steel, the effect of a change from an atmosphere of ordinary air to one of 11% CO is very striking. The center of a specimen in ordinary air reached the same temperature as the outside in 3 min., while in 5 min. it was 15° F. above that of the outside, and grain growth and surface damage were very marked. In an atmosphere containing 10 to 11% CO the center temperature stabilized a little lower than the outside, grain growth and surface damage were much reduced, and the steel could be left in the furnace much longer without damage.

Gas Ratios Compared

Curves were shown for the gas ratios of CO₂ to CO and of CH₄ to H₂ for city gas and for propane, using different proportions of air and different furnace temperatures. When these curves are compared with Stansel's curves for equilibrium, it is seen that in the ordinary commercial ratios of air to gas the CO₂ to CO ratio would have a decarburizing effect, while the CH₄ to H₂ ratio would have a carburizing effect. In the city gas mixture there would always be scaling if the ratio of air to gas were more than 2½ to 1, with no hydrogen present.

In one of the slides it was shown that the refractories in a furnace may absorb and release enough of the gas to affect the composition noticeably for some time after valve adjustments.

In spite of the complications it is found possible to get duplicate results with a given gas by using a thermal conductivity recorder. This gets rid of the delay and difficulty of making frequent gas analyses.

Gayety Reigns at Chicago Dinner Dance



Above—A Few of the Happy Throng Practising the Art of Terpsichore at the Chicago Chapter Dinner Dance on Jan. 28 at the Medinah Club.

Left—A. N. Lindberg, President of Lindberg Steel Treating Co., and aids pep up the crowd.



Ventures Definition For Rimming Steel

Norris Finds That Practices in Various Plants on Low Carbon Steel Differ Appreciably

By A. W. Demmler

Pittsburgh Chapter—Because of an unavoidable emergency, Frank Norris, open-hearth metallurgist, Wheeling Steel Corp., had little time to prepare his talk on "The Manufacture of Rimming Steel" presented at the meeting on Jan. 12. Nevertheless, he made a scholarly presentation to a crowd that almost necessitated an S.R.O. card to be hung at the door.

We talk freely of rimming steel but there seems to be no generally accepted definition, so Mr. Norris ventured this one of his own: "Rimming steel is steel which, during freezing, evolves gas at a rate great enough to keep the center of the top surface liquid during the formation of a characteristic rim of solid metal".

Rimmed Steel Dates to 1880

The early history of such steel commercially dated to Pittsburgh around 1880. The first critical study of the relation of deoxidation to ingot structure was Brinell's work reported by Walberg to the Iron & Steel Institute in 1902.

The talk was confined to low carbon (0.10%) rimming steel and representative melting practices of about a half dozen plants were compared; appreciable differences exist in the plants.

The percentage of pig in the charge may vary two to one and the manganese content of this may also vary as much. Raw versus burnt lime, and the time when it is added, show plenty of variation, but the iron oxide pins down pretty well around 25%.

The slags are watched carefully in all plants but not always in the same way, as fractures, "pancakes", lime-silica ratio, or some other feature may be chosen as the chief guide.

Considerable rimming steel is not reboiled. A ladle addition of ferro-titanium is sometimes used. The mold wash is generally tar. Rimming action depends on the condition of the heat at tap, the composition of the metal in the ladle, ladle additions, temperature of the metal, temperature of the molds, and the mold size. Mold additions of aluminum, spar, borax, scale, and clay also affect rimming and are used to secure the type of action desired.

Steel Analyses Now Narrower Herty States

Changes Necessitated in Steel-Making Practice, Notably Through Closer Control

By F. D. Steinway

Milwaukee Chapter turned air minded on Feb. 8 and took a transcontinental trip on the United Air Lines' "Mainliner" with the Milwaukee district traffic manager, E. J. Gelbos, via three very fine reels of film.

The comfort and safety of air travel were emphasized and a vivid picture presented of the complete maintenance equipment of this organization.

C. H. Herty, Jr., research engineer of Bethlehem Steel Co., then took over with a talk on "Recent Changes in Steel Making Practice".

He pointed out that in the last 15 years analyses of commercial steels have narrowed down, necessitating changes in steel making practice notably through the use of the carbometer, slag and temperature control.

The three classes of open-hearth heats were then discussed—namely, rimmed, semi-killed, and killed steels. Each class was thoroughly described along with the deoxidizing agents used.

The audience was then "aluminated" on the subject of grain size, for Dr. Herty had a very convincing demonstration to prove that fine grain is due to alumina in the steel rather than metallic aluminum.

Two heats were made with the same aluminum addition. One was melted, cooled, and forged in a hydrogen atmosphere, while the other was given the same treatment in air. The first was very coarse grained while the second was fine grained.

Al and Si Compared as Deoxidizers

Fine grain may also be produced by using silicon as the deoxidizer, but much more must be used than with aluminum. A very interesting slide showed the effects of various aluminum and silicon additions on the grain size of a heat.

The use of the normalizing temperature rather than the standard carburizing temperature for determining grain size, when the steel is not to be heated to the higher temperature in practice, was demonstrated by a slide showing the effects of temperature on grain size.

In the discussion which followed the talk, Dr. Herty compared the basic with the acid open-hearth process, and pointed out the great improvement in the basic process in late years.

The Chicago Chapter report on page 2 gives additional details of Dr. Herty's lecture.

R. S. Archer Speaks on "Hardenability of Steel"

By J. A. Smail

Mahoning Valley Chapter met Feb. 21 at the Ohio Edison Bldg., Youngstown, to hear R. S. Archer speak on "Hardenability of Steel".

Mr. Archer covered the history of early attempts to produce uniformity in hardening of steel; also the latest theories in this physical change. Time, temperature, surface, and technique in handling the steel to be hardened are controlling factors for uniformity.

Mr. Archer showed many lantern slides of steel sections, and also slides of graphs which fitted in very nicely in helping to get a clear understanding of his description of the nature of hardening.

Free Literature — Mail Coupon Below

Bronze Bearings

Bearing users may now secure advanced and complete sleeve-type bearing information and data by writing for the Johnson Bronze Co.'s new catalog. This beautiful 72-page publication, with simplified catalog indexing, incorporates important information on a complete bronze bearing service. Bulletin R-200.

Magnesium Alloy

An interesting data book covers a series of magnesium alloys of remarkable physical qualities known as Magalloy—a product of Magnesium Fabricators Division of Bohn Aluminum and Brass Corp. Bulletin R-201.

Case Hardening Baths

A. F. Holden Co. announces a new alignment of case hardening baths for maximum results at minimum cost. Complete data are contained in a folder and graph showing the savings made possible by the new reaction of these products. Bulletin R-202.

Handy Tool

That the "tool of 1001 uses" is rightly named will be admitted by anyone who looks over Chicago Wheel and Manufacturing Co.'s 63-page catalog on the "Handee". See how you can use it in your business. Bulletin R-203.

Inconel

The properties and uses of "Inconel," a corrosion-resisting alloy of approximate composition 79.5% Ni, 13% Cr, and 6.5% Fe are discussed in a valuable technical bulletin made available by the International Nickel Co., Inc. Bulletin Cc-45.

Are Welding

A well illustrated and comprehensive 20-page booklet giving the story of the new arc welding technique made available by the Lincoln "Shield-Arc" Welder with self-indicating dual continuous control is described in a booklet published by the Lincoln Electric Co. Bulletin Cc-10.

Temperature Indicator

A new switchboard-model temperature indicator with self-contained toggle-type switches for connecting any one of a number of couples to the measuring circuit can be had through the Leeds & Northrup Co. Bulletin Cc-46.

Ry Alloy Steel

Specialized developed to meet the demand for an oil hardening steel which, when heat-treated, would develop high hardness and deep penetration, Ry Alloy Steel is explained in a bulletin by Joseph T. Ryerson & Son. Bulletin Cc-106.

Annealing and Hardening

Annealing and hardening with SC atmosphere furnaces is dealt with in a new folder by the Surface Combustion Corp. Bulletin Cc-51.

Pure Metals

Pure, carbide-free metals are described and applications suggested in a pamphlet published by Metal & Thermit Corp., who make pure tungsten, chromium and manganese in addition to the ferro-alloys. Bulletin Ma-64.

Columbium

"Advantages of Columbium in Wrought 4 to 6 Per Cent Chromium Steel" is the title of a booklet which gives detailed test data to prove its advantages. Bulletin Cc-16.

Cost Survey

A Nielsen Engineering survey, giving a complete cost analysis and case history of a Wheelabrator installation which saved \$4655 a year is now available through the American Foundry Equipment Co. Bulletin Cc-112.

Stainless Steel

Technical bulletins describing the various types of Allegheny Stainless Steels are proving very helpful to those interested in steels of this nature. Bulletin Cc-92.

Hot Pressed Parts

Hot Pressed Parts and Pressure Die Castings made with substantial savings over other methods are described in an 8-page booklet just released by the American Brass Company. Bulletin Cc-89.

Insulation

A 32-page catalog containing specific information on all of the sheet, block and pipe insulations developed by the Johns-Manville Company is now available through that company. Bulletin Fb-100.

Costs

A new folder illustrating the complete line of indicating, recording and controlling instruments for measuring and controlling temperatures, pressures, flows, liquid levels and humidity has just been made available through the Brown Instrument Co. Bulletin Cc-3.

Welding Stainless

How to weld stainless steels is described in a colorful 12-page folder just released by the Page Steel and Wire Division of American Chain & Cable Co., Inc. Bulletin Cc-86.

Die Steel

Correct treatment for die steel is thoroughly described in literature issued by William Jessop & Sons. Interesting to stamping-die makers, especially. Bulletin Cc-61.

Non-Ferrous Pyrometer

A pyrometer which can use either "bare" or "protected" thermocouples on non-ferrous metals is described in an interesting folder released by the Pyrometer Instrument Co. Elements are interchangeable within a second and maximum and true temperature indication is reached within a few seconds. Bulletin Cc-37.

Tool Steel Selector

A wall chart, 30 x 20 in., to be used as a means for selecting the proper type of tool steel is offered by Carpenter Steel Co. to tool steel users in the U.S.A. only. Bulletin Jz-12.

Metal Heating

Improvements in furnace economies, operating conditions and appearance, furnaces that will more satisfactorily meet old requirements or handle new processes, service that will help solve the most stubborn problems are offered and described by Mahr Mfg. Co. in Bulletin Ea-5.

Easy Flow Brazing

Handy & Harman's Easy-Flo Brazing Alloy, a recent development, is recommended for joining stainless steel and iron, Monel metal, Inconel, Everdur and other ferrous and non-ferrous metals. Briefly described in Bulletin Ny-126.

Potentiometer Controllers

A new 24-page illustrated bulletin issued by the Foxboro Company completely describes appearance and action of their large line of controllers. Bulletin Cc-21.

Heavy-Duty Lubricants

Fresh off the press, a new folder by E. F. Houghton & Co. discusses the problem of lubricating slow moving loads under high pressure. Bulletin Cc-38.

Bristol Potentiometers

All of the Pyrometer Round-Chart Potentiometers manufactured by the Bristol Company are described in a new bulletin which explains the simple operating characteristics of Bristol's Pyrometer. Bulletin Nb-87.

Laboratory Service

A new edition of "The Metal Analyst" tells about an organization established by Adolph I. Buehler specializing in the installation of metallurgical laboratories. The complete line of laboratory equipment marketed by Buehler is also catalogued. Bulletin Dy-135.

Heat Treating Guide

A convenient guide for heat treating Columbia Tool Steels is now available. This device with revolving index shows grades, types, analyses, heat treating temperatures and Rockwell hardnesses. Bulletin Cc-115.

Spectrometry

A chapter on basic theory and design of spectrometers or spectrographs explaining the principle of operation in full detail precedes a catalog of spectrometric equipment by Bausch & Lomb Optical Co. Bulletin Fa-35.

Cadallyte "38"

A new technical service manual on CADALLYTE "38" for cadmium plating has been issued by the Electroplating Division of du Pont. Cites recent improvements and changes in the product, and gives detailed operating instructions and methods of analyses. A table of costs and time required for specified deposits is included. Bulletin Gb-29.

Cable Joints

Detailed instructions for splicing and vulcanizing all the principal types of rubber-insulated rubber-jacketed portable cable are given in a new 16-page booklet released by the General Electric Company. Bulletin Cc-60.

Pyrometer Accuracy

A thought-provoking folder of Hoskins Mfg. Company explains how the use of Chromel-Alumel for pyrometer lead-wires makes it possible to take full advantage of modern pyrometric instruments. Bulletin Ob-24.

Dehumidifier

Lectrodryer systems, employing activated alumina for drying air and gases by absorption, are described in an attractively illustrated booklet by the Pittsburgh Lectrodryer Corp., Pittsburgh. Bulletin Bb-187.

Park-Kase

A leaflet by Park Chemical Co. contains complete information concerning a new liquid carburizer of rapid and uniform penetration. Unique features and advantages of the bath are backed up with technical data. Bulletin Na-141.

Galvannealed Sheets

A unique answer to the question "Why Should I Use Republic Galvannealed Sheets?" is contained in an interesting folder just released by the Republic Steel Corporation. Points out advantages and shows typical installations. Bulletin Lb-8.

Small Appliances

A very helpful booklet showing various small appliances for a wide variety of heating jobs is now available through the American Gas Furnace Co. Bulletin Ac-11.

Heat Treat Chart

Heat treaters everywhere should find a heat treating wall chart complete with S.A.E. specifications a very valuable addition to their shops. Published by Chicago Flexible Shaft Co., manufacturers of Stewart industrial furnaces. Bulletin Ka-49.

Aluminum Finishes

Good printing, good paper, spiral binding and an attractive presentation add interest to the valuable technical information on "Finishes for Aluminum" contained in Aluminum Co. of America's new booklet. Bulletin Oy-54.

Laboratory Furnace

The Sentry Co. describes a high temperature tube combustion furnace. It permits operating temperatures up to 2500° F., thus offering greater speed and precision for combustion analysis or other laboratory procedures. Bulletin My-114.

Hardness Testing

A 4-page folder which has as its purpose "to give you an idea of how practical a thing it is to make hardness tests on raw stock or fabricated metal parts in all plants where metal is worked, and to suggest something of the necessity for making such tests, or at least their importance" is available through the Wilson Mechanical Instrument Co., Inc. Bulletin Fb-22.

Rust Preventive

A rust preventive which succeeds where others fail is described in literature made available by the Simoniz Co. Bulletin Cc-94.

Busch Metaphot

A metallurgical microscope with built-in reflex camera—the Busch "Metaphot"—is completely described in several interesting folders just released by George Scherr Co., Inc. This machine has revolutionized testing procedure in hundreds of shops and testing laboratories. Write for Bulletin Cc-206.

Spring Coiler

Sleeper & Hartley's new segment type spring coiler speaks for itself in a new bulletin. Thirteen points of superiority are carefully explained and illustrated. Complete specifications are given. Bulletin Bc-73.

Fabrication

"The Fabrication of USS Stainless Steels" is the title of a very attractive 54-page booklet issued by the United States Steel Corp. Describes in detail the welding, riveting and soldering techniques applicable to all the various grades of USS Stainless Steels. Bulletin Hb-79.

Tube Alloys

Practical data on tube alloys compiled by the Technical Department of the Driver-Harris Co. simplify calculations by providing derived constants in the shape of tables and formulae. Handy conversion tables included. Bulletin Bb-19.

Ampco Metal

The six grades of Ampco metal, varying in hardness and physical properties but all possessing wear resistance, tensile strength and corrosion resistance, are described in a booklet which also lists its uses in modern industry. Bulletin Ka-175.

Tool Steel Guide

A 36-page booklet which gives a clear picture of the entire range of tool steels and their fields of use, plus a systematic method for selecting the right steel for the purpose, is being released by Bethlehem Steel Co. Bulletin Bc-76.

Hydrazing

Hydrazing work is completely described in recent literature released by Lindberg Engineering Co. Points out advantages in particular applications. Bulletin Bc-66.

Racketeer

Fourth in the series of the famous Pangborn advertising pieces on the "Dust Hog" is available through the Pangborn Corp. Bulletin Bc-68.

Commercial Heat Treating

Commercial heat treating in Pittsburgh as practiced by the Pittsburgh Commercial Heat Treating Company is described in literature available through that organization. Bulletin Bc-83.

Effect of Silicon

A technical bulletin devoted to the effect of silicon on the properties of certain chromium-molybdenum steel tubes has just been released by Babcock & Wilcox Co. Bulletin Bc-75.

Stainless Data Book

All users of stainless and heat resisting alloys should find invaluable the information contained in a booklet published by Maurath, Inc., giving complete analyses of the alloys produced by the different manufacturers, along with the proper electrodes for welding each of them. Bulletin Jy-125.

Moly in Steel

Metallurgists, engineers and production executives who are really interested in the metallurgy of steels and their application will want the newly published book on molybdenum steels which has just been released by Climax Molybdenum Company. Bound in loose-leaf manner, this reference book is chock-full of tables which form a volume almost an inch thick. Bulletin Hb-4.

Tool Steels

The first of a series of stories on Crucible Steels and their performance has just been released by the Crucible Steel Company of America. Tells in an interesting manner some of the qualities to look for in tool steels. Bulletin Bc-56.

Gas Carburizing

A proven Muffleless Gas Carburizing Furnace with Continental Hypercarb Process for Hardening Steel is thoroughly described in a colorful 4-page booklet issued by Continental Industrial Engineers, Inc. Bulletin Lb-154.

Lubrication Improvements

Intensive research which completed important improvements in the field of heavy-duty gear and bearing lubrication is tabulated in a new 12-page illustrated bulletin just released by D. A. Stuart Oil Co., Ltd. Bulletin Lb-118.

Cr-Ni Castings

Calite Chromium-Nickel Alloy Castings for Rotary Hearth Furnaces are described in a release by The Calorizing Company. Pictures typical installations. Bulletin Cc-26.

Recuperators

Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data are given in Bulletin Fx-57.

Seamless Tubes

Prepared by the Timken Steel and Tube Division of Timken Roller Bearing Co. is a "Guide for Users of High Temperature Steels," which presents technical data relating to the various properties of Timken seamless tubes. Bulletin Bb-71.

Pre-Combustion Control

Control of furnace atmosphere is dealt with at length in a new folder just issued by C. I. Hayes, Inc. Bulletin Cc-15.

Mo-W High Speed

J. V. Emmons, metallurgist for Cleveland Twist Drill Co. and largely responsible for the development of the molybdenum-tungsten high speed steels known as Mo-Max, has prepared a general description of these new steels. Bulletin Ka-103.

Turbo-Compressors

Spencer Turbine Co. has turbo-compressors in all sizes and types for oil and gas-fired furnaces, ovens and foundry cupolas. Special types for special purposes such as gas-tight and corrosion resisting applications are also described in Bulletin Da-70.

Hardness Testers

A handy thing to have around for anyone who does much hardness testing is a complete and detailed catalog of the universal line of hardness testers carried by Pyro-Electro Instrument Co., together with information on various specialized pieces of auxiliary equipment. Bulletin Bb-197.

Bright Annealing

Various types of electric and fuel-fired furnaces built by the Electric Furnace Co. for bright-annealing wire, tubing, strip and other products are described in a new 8-page folder. Bulletin Lb-30.

Economical Microscope

A practical, easily-manipulated microscope for less than \$200 is described in a bulletin released by E. Leitz, Inc. Includes all necessary optical accessories. Bulletin Bc-47.

Heroult Furnace

Revised and expanded to include modern major innovations in the construction and operation of the Heroult electric furnace, a new edition of the American Bridge Co.'s Heroult Electric Furnace Bulletin is now ready for distribution. Bulletin Bb-124.

Heat Resisting Alloys

Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Ni-Cr Castings

Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Ingot Production

"The Ingot Phase of Steel Production" is the title of a book defining the principles of quality ingot production followed by many well-known steel manufacturers. Gathmann Engineering Co. Bulletin Ka-13.

Bessemer Steel

Jones & Laughlin Steel Corp. has for distribution reprints of the paper by C. C. Henning on "Manufacture and Properties of Bessemer Steel" that received the Robert W. Hunt Award of the A.I.M.E. during 1935. Bulletin Ca-50.

Testing with Monotron

Shore Instrument & Mfg. Co. offers a bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Jc-33.

Defi Rust

Analysis and descriptive notes of nine types of heat and corrosion resisting steels made by Rustless Iron and Steel Co. are contained in a handsome folder. Bulletin Ha-169.

Duronze III

A technical bulletin covering Duronze III, a patented high strength silicon aluminum bronze, has just been released by the Bridgeport Brass Co. Describes typical uses and shows comparative tables. Bulletin Ac-163.

Furnaces

Two booklets, of 27 and 30 pages respectively, catalog, illustrate and fully describe the line of "Electric Heat Treating Furnaces" and "Fuel Fired Furnaces, Ovens and Kilns" built by Hicroft & Company. Bulletin Cc-203.

The Review

7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature. (Circle the numbers that interest you. It is important to write in your company or business connection when you return this coupon.)

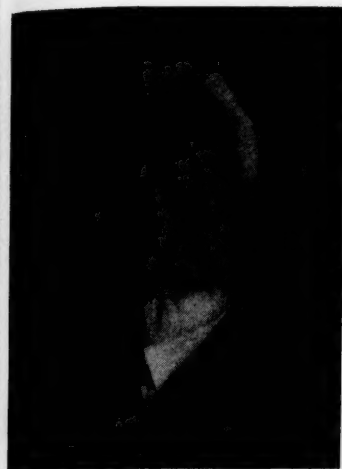
Name Title

Company

Company Address

Col. 1	Col. 2	Col. 3	Col. 4
R-200	Cc-51	Cc-98	Nb-87
R-201	Ma-64	Cc-61	Dy-135
R-202	Cc-16	Cc-37	Cc-115
R-203	Cc-112	Jz-12	Fa-35
Cc-45	Cc-92	Ea-5	Gb-29
Cc-10	Cc-89	Ny-126	Cc-60
Cc-46	Fb-100	Cc-21	Ob-24
Cc-106	Cc-3	Cc-38	Bb-187
Na-141	Hb-79	Bc-56	Bc-47
Lb-8	Lb-154	Lb-118	Bb-124
Ac-11	Ka-175	Cc-26	Fx-32
Ka-49	Bc-76	Bb-71	Ka-13
Oy-54	Bc-66	Cc-15	Ca-50
My-114	Bc-68	Bb-77	Je-33
Fb-22	Bc-83	Ca-103	Ha-169
Cc-94	Bc-75	Da-70	Ac-163
Cc-206	Jy-125	Fb-197	Cc-203
Bc-73	Hb-4	Lb-30	

Theodor Wiedemann Dies in Philadelphia



Theodor Wiedemann

THEODOR WIEDEMANN, 71, a member of the Philadelphia Chapter since 1920, died on Feb. 2, of pneumonia.

With exactly \$27 in his pocket, proceeds of his machinist apprenticeship, young Wiedemann arrived in this country at the age of 20. As a machinist, he worked at various times at the Budd Mfg. Co., both in Detroit and Philadelphia. Later he was superintendent of the Keller Mfg. Co. of Philadelphia, makers of pneumatic tools. He developed 27 patents for this concern.

In 1916, he founded his own metal machinery factory, The Wiedemann Machine Co., specializing in the manufacture of turret presses and commercial heat treating.

Mr. Wiedemann had a great many friends in the Society and founded the Chapter Library which bears his name. He served as a special lecturer to the students of the Chapter and sponsored a heat treatment and metallography course at Philadelphia's Temple University.

Each year, for a long time, he invited the students and faculty to his plant. At that time he demonstrated many practical points of heat treating and wound up the evening by serving a sumptuous buffet supper to all. He was ever interested and willing to help young men to secure knowledge and a start on the way to success.

A few years ago, he gave the Chapter a most interesting coffee talk about his flight from Germany to the United States on the airship Hindenburg. In 1937, he was awarded an honorary degree by Temple University for improvements he made in the art of heat treating metals.

He will be missed in Philadelphia.

Machining of Metals Course Answers Many Questions

What is meant by "machinability"? Will a tool of the same design cut different metals efficiently? Is chip form related to surface finish?

These are some of the questions being answered in the special evening course on "Machining of Metals" being conducted during March by the Worcester Chapter.

The course consists of five illustrated lectures held on successive Monday evenings starting March 6 and ending April 3. Speakers are W. R. Frazer, Union Twist Drill Co.; Anthony J. Snyder, Morse Twist Drill Co.; Vincent O. Stromberg, John Bath Co., Inc.; W. E. Bancroft, Pratt and Whitney Co.; and D. K. Crampton, Chase Brass and Copper Co.

HERE AND THERE WITH A.S.M. MEMBERS

FRED GROTT, for the past few months vice-president and works manager, Chicago Steel Foundry Co., and previously vice-president, Lebanon Steel Foundry, has been elected president and a director, Fort Pitt Steel Casting Co., McKeesport, Pa.

Educated at University of Illinois and Missouri School of Mines and Metallurgy, Mr. Grotts became chief metallurgist and chemical engineer for Curtiss Aeroplane & Motor Corp., Buffalo. Here he had technical control over metallurgical processes during the World War, and was cited by the United States, England and France for outstanding results of research and development in materials.

AS ASSOCIATE engineer with the U. S. Department of the Interior on the Bonneville Dam Project at Portland, Ore., CARL H. BJORQUIST has for the past six months been inspecting various types of cable and line accessories.

For about a year he will travel in the East as technical inspector of materials and equipment being purchased for the project, although he will maintain his business headquarters in Portland.

WILLIAM J. O'SULLIVAN (B. S. in Aeronautical Engineering, University of Notre Dame, 1937) has passed a civil service examination as junior aeronautical engineer. He has been appointed for probational duty at Langley Field, Va., in the flight research division of National Advisory Committee for Aeronautics. After six months of satisfactory service the appointment will become permanent.

PROMOTED by Vanadium Corp. of America to assistant to general manager of sales is JOHN W. LOHNES, who has been in the Chicago office of the corporation for the past three years. Prior to his association with

Vanadium, Mr. Lohnes was with Carnegie-Illinois Steel Corp. in Chicago. He will make his headquarters in New York.

A NEW appointee in the Department of Mechanical Engineering, Armour Institute of Technology, Chicago, is R. G. MINARIK. A graduate of Case School of Applied Science, Dr. Minarik received his M.S. from Yale and his doctor's degree from University of California in 1934. From 1933 to 1937 he was instructor in mechanical engineering at University of California.

Author of many technical articles, Dr. Minarik has engaged in extensive consulting work, having been chemist of the Ohio Chemical Co. of Cleveland, consultant to Columbia Axle Co., research and development engineer for the Vlcek Tool Co., and engineer in charge, San Francisco Bay Region Tire Survey.

Better Refractories And Furnace Design Improve Open-Hearth

By George E. Stoll

Notre Dame Chapter—"The Development of the Open Hearth Process" was outlined on Feb. 8. G. D. Tranter, general superintendent of the Middletown Division of the American Rolling Mill Co., gave an interesting and enlightening treatment of the subject.

The early open-hearth furnaces were crude and had capacities of only 1 to 5 tons. These furnaces were rather inefficient and carried high maintenance costs.

However, development was very rapid and at the turn of the 20th century many open-hearth furnaces were being successfully operated. The most valuable improvements in the operation of the furnaces were brought about through better furnace design and improved refractories.

Mr. Tranter discussed the difference between the basic and acid open-hearth methods of making steel but confined his discussion of personal experiences in steel making largely to the basic method.

He stressed the importance of the furnace lining which in the basic open-hearth is mainly magnesite fused with a small percentage of open-hearth slag. For the production of high quality steel the furnace operators must give close attention to the furnace lining.

Recent developments have been largely confined to furnace accessories, both on the charging end and in the pit. Modern machines have been developed to handle the raw materials and the molten product rapidly.

Much progress has been brought about through the development of better transportation facilities for raw materials which made possible the increased capacity of the open-hearth furnace. The modern charging machine is one of the greatest factors in bringing about increased capacity.

Naturally, recent development has not been confined to auxiliary equipment alone and much further improvement has been made in the refractories, and through the installation of combustion control equipment. The furnace itself has been improved by the sloping backwall, improved draft regulation and capacity, and better engineering and construction.

Mr. Tranter's address was sufficiently technical to present a clear picture to the metallurgist, and at the same time detailed the process to the layman.

Trouble Shooting Discussion Gives Practical Pointers

By Ray P. Dunn

North West Chapter—One of the finest talks of the season was presented on Feb. 9 by Roy D. Allen, supervisor of service metallurgists for the Republic Steel Corp. in the Chicago District. His subject was "Trouble Shooting on Steel Problems".

Mr. Allen presented a wealth of information—the type of material one often looks for in literature references but finds it must be gained through observation and experience alone—on a wide variety of subjects, such as heat treating, suitable steels for various purposes, the value of proper design, and the necessity for accuracy and maintenance in the use of physical testing equipment.

He cited numerous practical examples to illustrate his various topics and

showed by graphical demonstration on a blackboard the cause, effect and cure for each problem.

Following his speech, the excellent technicolor picture of the United States Steel Subsidiaries called "Steel—Man's Servant" was shown.

The meeting was brought to a close with a very interesting question and answer session on trouble shooting.

Seniors Introduced to Industry

A unique method of advertising senior students who will be in the market for jobs in June is utilized by the Missouri School of Mines and Metallurgy, where the American Society for Metals has a student group.

This consists of an attractively printed booklet introducing to industry the class of 1939. Photographs and brief notations of the field and activities of each graduate are contained.

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CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 17	Engineers Club	J. L. Gregg	High Tensile, Low Alloy Steels
Boston	Apr. 7	Chamber of Commerce	C. T. Harris	Place of Minerals in National Defense
Buffalo	Apr. 13	Hotel Buffalo	F. B. Doane	The Magnaflex Test and Its Relation to Industrial Progress
Buffalo	Apr. 21, and 22			Regional Meeting at Rochester
Calumet	Apr. 22	Carnegie-Illinois Steel Corp. and Knights of Columbus Hotel, Gary, Ind.	E. E. Moore	Trade, Employer Obligations of the Technologist
Canton-Mass.	Apr. 20	Hotel Onesto	A. W. F. Green	Hunting and Fishing in Alaska (motion picture)
Chicago	Apr. 13	Medinah Club	K. R. Van Horn	Age Hardening
Chicago	Apr. 22	Carnegie-Illinois Steel Corp., Gary, Ind.		Joint plant inspection trip with Calumet and Notre Dame Chapters
Cincinnati	Apr. 20	Hotel Alms		Unusual Surface Hardening (Tri-Chapter meeting)
Cleveland	Apr. 3	Cleveland Club	O. E. Harder	Bird's Eye of Metallurgy
Columbus	Apr. 11		R. M. Smith	Cold Heading
Columbus	Apr. 20	Cincinnati		Tri-Chapter meeting
Dayton	Apr. 12	Engineers Club	R. M. Smith	Cold Heading
Dayton	Apr. 20	Cincinnati		Tri-Chapter meeting
Detroit	Apr. 10	Fort Shelby Hotel	A. H. d'Arcambal	Tool Steels
Hartford	Apr. 11	Hartford Electric Light Co.	A. D. Bach	Practical Heat Treatment
Indianapolis	Apr. 17	Washington Hotel	N. I. Stotz	Tool Steels
Lehigh Valley	Apr. 21	Hotel Traylor, Allentown, Pa.		Annual Dinner Dance
Mahoning Valley	Apr. 11		A. B. Kinzel	Low Alloy Steels
Milwaukee	Apr. 20	Milwaukee Athletic Club	F. R. Bonte	Graphitic Steels
Montreal	Apr. 3	Windsor Hotel	W. R. Coulter	Welding of Non-Ferrous Metals
Muncie	Apr. 20	New Castle, Ind.	P. W. House	Alloy Cast Irons
New Haven	Apr. 20	University Club, Bridgeport	Ralph Cleveland	Hard Chromium Plate
New Jersey	Apr. 17	Essex House, Newark	R. A. Gezelius	Steel Castings
New York	Apr. 10	2 Park Ave., New York City	A. F. Steubing	Low Alloy High Tensile Steels
North West	Apr. 12	Minnesota Union, Univ. of Minn.	K. R. Van Horn	Recent Developments in Aluminum and Magnesium Alloys
Notre Dame	Apr. 12	Engineering Auditorium, Univ. of Notre Dame	G. B. Waterhouse	Career Possibilities in the Field of Iron and Steel
Ontario	Mar. 31	Toronto	A. B. Kinzel	Effect of Alloy Additions in Steel Making
Ontario	Apr. 21, and 22			Regional Meeting at Rochester
Oregon	Apr. 7	Lloyds Golf Club	Mr. Corteyou	Cast Iron Car Wheels
Penn State	Apr. 21	Nittany Theater	R. W. Steigewalt	U. S. Steel Corp. sound films on Steel Making
Philadelphia	Apr. 28	Engineers Club	N. L. Mochel	Applications of Non-Ferrous Metals
Pittsburgh	Apr. 13	Roosevelt Hotel	H. P. Rassbach	Electric Steel Melting
Puget Sound	Apr. 8	Engineers Club, Seattle, Wash.	L. R. Oberg	The Oxy-Acetylene Torch
Rhode Island	Apr. 5	Providence Engineering Society Bldg.	H. W. McQuaid	
Rochester	Apr. 21, and 22	University of Rochester	D. A. Wallace	Regional Meeting
Rockford	Apr. 11	Elks Club	K. R. Van Horn	Age Hardening
Saginaw Val.	Apr. 11	Herman Fischer Hotel, Frankenth, Mich.	A. B. Bixby	Automotive Sheet and Strip
Schenectady	Apr. 18	Rensselaer Polytech. Inst., Troy, N. Y.	W. P. Woodside	Panorama of Alloys in Steel
Southern Tier	Apr. 21, and 22	Jenkins Inn, Waverly, N. Y.	W. P. Woodside	Panorama of Alloys in Steel
Southern Tier	Apr. 24		Haig Solakian	Heat Treating in Salt Baths
Springfield	Apr. 17	Atthol, Mass.		Joint meeting with Mo. School of Mines and Metallurgy
St. Louis	Apr. 21	Rolla, Mo.		
Syracuse	Apr. 21, and 22			Regional meeting at Rochester
Texas	Apr. 13		H. W. McQuaid	Selecting the Right Steel for the Job
Toledo	Mar. 27	University Club	R. J. McKay	Nickel Electrodeposits and Nickel Non-Ferrous Alloys
Tri-City	Apr. 11			Inspection Trip
Washington	Apr. 10	Garden House, Dodge Hotel	S. L. Hoyt	Impact Testing
Worcester	Apr. 8	Sanford Riley Hall, Wor. Polytech. Inst.		U. S. Steel Corp. Sound Films on Steel Making
York	Apr. 13	Harrisburg, Pa.		Application of X-Ray Metallurgical Problems

Employment Service Bureau

Address answers care A. S. M., 7016 Euclid Ave., Cleveland, unless otherwise stated

Positions Open

SALES ENGINEER: For heat treating chemicals. Practical experience in heat treating and hardening of steel desirable. Must be capable of handling salesmen and act as go-getting, working sales manager. Should be around 40 years old. Box 3-25.

RECENT GRADUATE from first-class physical metallurgy course for development work (largely non-ferrous). Location in northern Ohio. Business—automotive parts and related products. State training, qualifications and kind of work desired. Box 3-40.

YOUNG METALLURGICAL or foundry engineer, with some practical moulding experience, for sale of alloys and development of markets for alloy iron and steel castings, in central western territory. Box 3-55.

Positions Wanted

METALLURGICAL ENGINEER: Resident London, England, desirous of contacting American metallurgical firms with view acting advisory capacity in Europe. 20 years experience iron, steel, and non-ferrous plants, processes and manufacture. Box 3-35.

METALLURGICAL ENGINEER: B.S. Carnegie Tech 1935; also certificate in metallurgical Swedish Mining Academy 1924. 14 years experience; 9 years in charge of physical and metallographic laboratory, planning and directing research, melting and processing molybdenum and tungsten high speed steel, stainless cutlery steel, aircraft steel. Knowledge of German and Swedish. Box 3-20.

METALLURGIST: Age 36, 15 years practical experience. Now chief metallurgist of large tractor plant. Desires position as chief metallurgist or assistant superintendent in progressive organization. Production work

preferred but will consider sales service work. Good knowledge of handling men; excellent business and personal references. Box 1-5.

CHIEF METALLURGIST: Age 39. Eleven years supervising metallurgical laboratory, malleable and alloy steel melting and all heat treating operations. Desires position as metallurgist or assistant superintendent in progressive organization. Production or research work preferred but will consider sales service work. Box 3-5.

PROFESSOR OF METALLURGY desires summer position with permanent possibilities. Ph.D. in physical chemistry and physical metallurgy; four years of industrial experience and eight years teaching metallurgy in engineering schools. Will consider either industrial or teaching position. Box 3-10.

SALES ENGINEER: Age 33, married. Experienced in instrument and affiliated selling. A.S.M., A.S.T.M. Box 3-15.

FACTORY MANAGER: 15 years experience in manufacture of drop forged tools; complete understanding of cost and production control; personality adapted to handling men. Now employed; references. Box 3-30.

COLLEGE GRADUATE: Age 29. Employed in laboratory of large strip mill. Experience in metallography, testing and research; production of beamer steel in supervisory position. Desires laboratory or contact work. Box 3-45.

METALLURGIST AND CHEMIST: B.Ch.E., M.S.E. Univ. of Mich. 20 years in charge of chem. and met. laboratory and heat treating department of metal cutting tool plant; thoroughly familiar with routine analysis, metallography, hardness testing, heat treating alloy and high speed steel. Heat treating foreman or sales work considered. Box 3-50.

New Tool Developments Too Numerous to Keep Up With Says d'Arcambal

By Anthony C. Kowalski

Worcester Chapter—In a talk replete with specialized information and interspersed with uproarious stories of his experiences, A. H. d'Arcambal, consulting metallurgist of the Pratt & Whitney Co., kept a large audience intensely interested at the meeting on March 2 and "delivered" himself of a talk on "New Developments in the Cutting Tool and Gage Field" in a creditable way.

The factors governing the quality of tools and gages—namely, design, material, heat treatment and, last but not least, finish, a new factor—were discussed by Mr. d'Arcambal in a comprehensive manner.

The speaker, however, opined the fact that so many new tool steels are on the market today, that it is almost impossible for the manufacturer of

tools to test these innovations sufficiently for all the applications because of lack of time.

Slides of different tools and gages were shown in conjunction with the talk. The Electrolimit gage, its application and great accuracy, duly impressed the audience.

A discussion period followed which brought out some interesting questions and answers. Mr. d'Arcambal was given a sincere vote of thanks and his speedy return was wished for by the large gathering.

"Chemical Warfare" was the subject chosen by the coffee speaker, Duane E. Webster, of the Norton Co., who traced the use of poison gases from early times to the present.

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